Exploring the course development model for the mobile learning context: A preliminary study

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Abstract

This study intends to develop a course development model for the mobile learning context through the joint course development with the elementary school teachers, which proposes 6 stages of the mobile learning curriculum model. Moreover, the model differs from the traditional ISD model in the emphases of integration of mobile technology in the learning context and can be a reference for the further studies.

1. Introduction and background

The fast evolving wireless communication network and popular, low-cost mobile device technology lead us to the era of mobile learning, which also gradually change the way of learning.

Researchers and scholars have given mobile learning several definitions. For example, Quinn (2000) explains that "mobile learning is e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone." Shepherd (2001) says "M-learning is not just electronic, it's mobile." Harris (2001) defines "mobile learning as the point at which mobile computing and e-learning intersect to produce an anytime, anywhere learning experience." Some researchers indicate that according to the mobile learning theory, mobile learning learners can utilize wireless network and mobile learning device to get convenience, expediency and immediacy of mobile learning in appropriate time and accessing appropriate learning content (Y. J. Su, H. Y. Pen & Chien Chou, 2004).

Above those researchers all focus on the learning advantages of mobile technology in mobile learning. However, the researchers of this study claim that except the applications of mobile technology, more attention should be laid on the development of learning content, learning context and the adjustment of instructional strategies. Not only should we focus on mobility of mobile learning, but also should focus on the process of learning.

Secondly, Taiwan Executive Yuan promotes M-Taiwan plan, which build up wireless network basic environment. Therefore, the schools can make use of wireless wide-band technique and applied the service for "mobile learning", and create a better mobile learning environment. Moreover, Hsin-chu city government has sponsored local elementary schools to setup wireless campuses since 2004, but teachers have very limited applications in integrating wireless technologies in instruction.

Therefore, this study investigates the integration of mobile technology, development of curriculum and teaching strategy in a primary school. It is hoped that the induced course development model and related research findings can shed light on the use of mobile technology in primary education and thus help promote mobile learning.

2. Literature Review

2.1. Brief overview of studies in mobile learning in primary education

Marc Prensky (2001) indicates that children grow up with wireless mobile technology in modern society. Thus, the children used to utilize portable technology for learning and entertainment; and their ways of thinking and dealing information all differ from adults. In order to discuss suitable ways of learning which can coordinate children's growing up experiences, some technologically-advanced countries start to conduct wireless mobile technology in primary education.

In Taiwan, Y.S. Chen, et al. (2003) developed Bird-Watching Learning system on PDA, and combined with the scaffolding theory to study what role mobile learning system played and what functions it offered on bird-watching of the wireless mobile ad- hoc network for students. Furthermore, Y.S. Chen, et al. (2003) used content-based butterfly- image retrieval technique to develop a mobile butterfly- image learning (BWL) system. The BWL system helped learners make just-in-time confirming of the spice, name and biological behavior of the butterfly, which the students observed on the wireless mobile ad- hoc network. The significance is that learners can learn independently by using mobile technology.

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In U.S.A., University of Michigan, Center for Highly Interactive Computing in Education (Michael, et al.2002) described that Palm was usually applied to k-12 learning activities such as discussion, concept map, notes, reporter and information online search. It appears that handheld computers can support cooperative learning of students and facilitate more interactions. Secondly, Kathleen et al. (2003) developed the concept map tools of handheld devices in the view of Learner-Centered Design and scaffolding theory, and these tools help students to construct correct concept map for subject reports.

According to the analysis above, most literatures of mobile learning are based on computer engineering. However, few researches design to study how mobile technology influences the mode of curriculum development in primary schools.

2.2. Instructional system design (ISD) model

This study takes traditional instructional system design model as reference to see what will be changed if it applied to mobile learning. Then it can guide suitable model of mobile learning curriculum.

ISD refers to an organized procedure of teaching process, such as instructional object, instructional content, learners and instructional strategy and media and so on, and make these basic elements to a model. Let's use ADDIE as an example. ADDIE instructional system refers to the following steps: Analysis, Design, Development, Implement, and Evaluation of instruction (Seels & Richey, 1994). Analysis defines learning content, Design defines the way of learning, Development selects and makes teaching material, Implement uses materials and strategy in instruction and Evaluation confirms the effect of instruction (Barbara B. Seels & Rita C. Richey, 1994).

Moreover, ASSURE instructional model developed by Heinich R., et al. (1989) contains the following steps: (1) **A**nalyze learners: it refers to learning style, prerequisite knowledge or skills, motional, cultural or economic issues; (2) **S**tate objectives: it refers to describe learning objective precisely; (3) **S**elect media and material: it refers to arrange instructional strategy suitably; (4) **U**tilize media and materials: it refers to plans for utilize instructional media and technology; (5) **R**equire learner participation: it refers to provide students with opportunities to practice skills and learn actively; (6) **E**valuate and revise: it refers to evaluate and revise whole instructional design for future instruction.

The two representative ISD models presented above have been developed and used in the field of traditional education technology for decades. Currently, information communication technology (ICT) integrated in education brings new and formidable challenges for curriculum designers and teachers (chou & Tsai, 2002), let alone the wireless mobile technology. Thus the authors argue that developing mobile learning curriculum requires new methods or steps, in addition to the traditional ISD models. This study intended to explore an appropriate course development model for the mobile learning context through the joint course development with the elementary school teachers. A model containing due process has been documented and induced.

3. Methodology

This study adopts qualitative method, including literature reviews and observations in order to explore the model of developing mobile learning curriculum of the primary school.

3.1. Participants

This study was conducted from July to December 2004.The cooperative school is a representative of the Information Master school of the National Information Technology Master Plan financially supported by the Ministry of Education (MOE). It is located in the rural area by the seaside in the north of Taiwan. The observed objects were the crabs living in the marsh area. The curriculum of wireless mobile learning technology is developed for School-based curriculum which conducts students to theme-based or project-based exploring learning in an outdoor environment.

4. Research Question

This study emphasizes to find the components of model for mobile learning curriculum that integrated wireless mobile technology in outdoors situation.

5. Mobile learning curriculum model

With reference to the ADDIE and ASSURE models, this study tries to meet the needs of the teachers and experts of the instructional technology in order to induce a mobile learning curriculum model used for the elementary schooling setting. This model intends to integrate the characteristics of the wireless mobile technology and outdoors learning situation. Based on the data collection and analysis, the model contains six stages: (1) Analysis of the learners' needs and mobile situation; (2) Integration of the mobile-technology-based instructional/learning environment; (3) Design of mobile instructional strategies; (4) Design and development of mobile learning content; (5) Implement instructional activities; (6) Evaluation of mobile learning effect, as illustrated in figure 1 bellow.

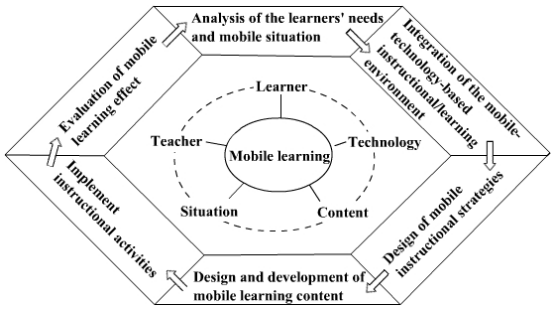

Figure 1. The development of mobile learning curriculum model

In figure 1, stage1, **Analysis of the learners' needs and mobile situation**, includes: (1) to analyze the needs of integrating mobile technology for helping students' learning; (2) to analyze the readiness of learners' skills of using technology; (3) to collect a variety of learning resources; (4) to analyze outdoors learning environment and its conditions, such as weather, wind, tide, safety and traffic condition and logistical supports.

Stage2, **Integration of the mobile-technology-based instructional/learning environment**, includes: (1) analysis of mobile devices: it needs to consider features and suitability of wireless mobile technology, such as weight, resolution and size of monitor, computational power, type of input, accessibility, etc. (2) analysis of constructing the wireless environment: in the given outdoor environment, the GPRS will be used to connect to the internet. When teachers have outdoors mobile learning activities, they are suggested to consider the most flexible wireless access to the internet. That can provide students with and easy way to get digitized information.

Stage3, **Design of mobile instructional strategies**, includes: (1) Because outdoors mobile learning is an open environment for learners, it needs to plan a core content for the mobile learning, or students might lose their attention in the open environment. That is why this study has to build up a mobile learning website to help students construct prerequisite knowledge of mobile learning in advance. When students use wireless mobile technology in outdoors situation, they can associate their prerequisite knowledge with the natural environment. Then they can make meaningful mobile learning and enhance their learning through the exploration outdoors. (2) The teacher can adopt group collaboration learning strategy when students have to do outdoors mobile learning. It makes learners learn how to share, communicate and solve problems together.

Stage4, **Design and development of mobile learning content**, includes: (1) to plan the organized learning content; (2) to state precise learning objectives; (3) to select suitable instructional media; (4) to develop digital multimedia learning content; (5) to arrange the timetable of curriculum, allocation of labor forces.

Stage5, **Implement instructional activities**, includes: (1) to arrange the whole instructional activities of the mobile learning and learning situation that follow the Nine Events of Instruction proposed by Gagne. The teacher should familiarize students with learning content, in order for them to build up prerequisite knowledge. (2) to train students to use the mobile devices, especially those basic function operation. (3) to observe their group collaboration activities while the students were using the mobile devices such as PDA, tablet pc in outdoors situation.

Stage6, **Evaluation of mobile learning effect**. In this step, the teachers apply multi-evaluation ways to evaluate students' learning effect, including both quantitative tests and qualitative report.

6. Conclusion and future study

The course development model induced from this study consists of 6 stages. In addition, the model differs from the traditional ISD model in the emphases of integration of mobile technology in the learning context. Whether or not the induced model will be actually useful for the students of the 5th graders in this cooperative elementary school, empirical data about the instructional and learning process will be collected in the coming semester. By that time, more study results and research findings will be reported.

7. References

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